AMENDMENTS TO THE CLAIMS:

Claim 1 (Withdrawn): A quantum cascade laser comprising:

an active layer, having a cascade structure, in which quantum well light emitting layers and injection layers are laminated alternately on a semiconductor substrate formed of GaAs, and generating light by intersubband transitions in a quantum well structure;

a waveguide core layer, formed adjacent said active layer; and

a waveguide clad layer, formed adjacent said waveguide core layer at the side opposite the side of said active layer; and

wherein said waveguide core layer is formed of a group III-V compound semiconductor, containing, as the group V elements, N and at least one element selected from the group consisting of As, P, and Sb, and formed so as to be lattice matched with said semiconductor substrate.

Claim 2 (Withdrawn): The quantum cascade laser according to Claim 1, wherein said waveguide core layer is formed to a predetermined thickness that is set so that optical modes of higher orders will not be guided.

Claim 3 (Withdrawn): The quantum cascade laser according to Claim 1, wherein said waveguide clad layer contains a high-concentration doped layer formed of a group III-V compound semiconductor, containing, as the group V elements, N and at least one element selected from the group consisting of As, P, and Sb.

Claim 4 (Withdrawn): A quantum cascade laser comprising:

an active layer, having a cascade structure, in which quantum well light emitting layers and injection layers are laminated alternately on a semiconductor substrate formed of InP, and generating light by intersubband transitions in a quantum well structure;

a waveguide core layer, formed adjacent said active layer; and

a waveguide clad layer, formed adjacent said waveguide core layer at the side opposite the side of said active layer; and

wherein said waveguide core layer is formed of a group III-V compound semiconductor, containing, as the group V elements, N and at least one element selected from the group consisting of As, P, and Sb, and formed so as to be lattice matched with said semiconductor substrate.

Claim 5 (Withdrawn): The quantum cascade laser according to Claim 4, wherein said waveguide core layer is formed to a predetermined thickness that is set so that optical modes of higher orders will not be guided.

Claim 6 (Withdrawn): The quantum cascade laser according to Claim 4, wherein said waveguide clad layer contains a high-concentration doped layer formed of a group III-V compound semiconductor, containing, as the group V elements, N and at least one element selected from the group consisting of As, P, and Sb.

Claim 7 (Currently Amended): A quantum cascade laser having a unipolar laser device structure, comprising:

a semiconductor substrate formed of GaAs; and

an active layer, disposed on said semiconductor substrate and having a plurality of quantum well light emitting layers, each having a quantum well structure including a quantum well layer and quantum barrier layer and generating light by means of intersubband transitions in [[a]] the quantum well structure, and a plurality of injection layers, respectively disposed between the plurality of quantum well light emitting layers and forming a cascade structure along with said quantum well light emitting layers; and

wherein said quantum well light emitting layers and said injection layers of said active layer are formed to contain group III-V compound semiconductors, each containing, as the group V elements, N and at least one element selected from the group consisting of As, P, and Sb; and

wherein, in said active layer, electrons move successively in a cascading manner among said quantum well light emitting layers, and light is generated in the process of the intersubband transition at each light emitting layer.

Claim 8 (Original): The quantum cascade laser according to Claim 7, wherein the composition ratio of N in said group III-V compound semiconductor is no less than 0.1% and no more than 40%.

Claim 9 (Withdrawn): The quantum cascade laser according to Claim 7, further comprising a semiconductor layer formed adjacent said active layer, disposed at least either between said semiconductor substrate and said active layer or at the side of said active layer

opposite the semiconductor substrate side and formed of a group III-V compound semiconductor, containing, as the group V elements, N and at least one element selected from the group consisting of As, P, and Sb.